

Applicant: Warren
For: Foldable Member

- 1 1. A foldable member comprising:
 - 2 at least a first tube;
 - 3 at least one predetermined hinge area along the length of the
 - 4 first tube; and
 - 5 opposing sets of elongated slots in the tube at the hinge area
 - 6 thereof forming separated longitudinal strips of tube
 - 7 material between the slots which fold when subjected to localized
 - 8 buckling forces,
 - 9 each slot of each set of elongated slots separated
 - 10 longitudinally along the length of the tube from each adjacent slot by
 - 11 a bridge element of tube material.
 - 1 2. The foldable member of claim 1 in which the opposing sets of elongated
 - 2 slots are diametrically opposed from each other on the tube.
 - 1 3. The foldable member of claim 1 in which each slot in each set of slots is
 - 2 diametrically opposed from a slot in the opposing set of slots.
 - 1 4. The foldable member of claim 1 in which there are two sets of slots.
 - 1 5. The foldable member of claim 4 in which there are two slots in each set of

2 slots.

1 6. The foldable member of claim 1 in which there are two sets of slots and
2 two slots in each set.

1 7. The foldable member of claim 1 in which there is a stress relieving
2 member attached to each bridge element on the inside of the tube.

1 8. The foldable member of claim 1 in which the tube is made of a plastic
2 material.

1 9. The foldable member of claim 1 in which the tube is made of a composite
2 material.

1 10. The foldable member of claim 9 in which the composite material includes
2 a triaxial braid of fibers in a resin matrix.

1 11. The foldable member of claim 1 in which there are a plurality of hinge
2 areas spaced from each other along the length of the tube, each hinge area including
3 opposing sets of elongated slots.

1 12. The foldable member of claim 1 further including an electrical conductor
2 disposed in the tube.

1 13. The foldable member of claim 1 further including at least one transducer
2 device located proximate a hinge area for controlling the folding of the longitudinal strips
3 of tube material.

1 14. The foldable member of claim 1 further including slot reinforcing
2 members disposed in the slots.

1 15. The foldable member of claim 1 in which the elongated slots are triangle
2 shaped.

1 16. The foldable member of claim 1 in which the elongated slots are diamond
2 shaped.

1 17. The foldable member of claim 1 in which there are four slots in each set of
2 slots, each slot of a pair of the four slots opposing another slot.

1 18. The foldable member of claim 1 in which each slot has a reduced diameter
2 portion.

1 19. The foldable member of claim 1 further including a second tube disposed

2 inside the first tube.

1 20. The foldable member of claim 19 in which the second tube includes
2 opposing sets of elongated slots at the hinge area thereof.

1 21. A collapsible structure comprising:

2 a plurality of joined members;

3 a selected number of said members each including:

4 a tube;

5 at least one predetermined hinge area along the

6 length of the tube; and

7 opposing sets of elongated slots in the tube at the hinge area

8 thereof forming separated longitudinal strips of tube material

9 between the slots which fold when subjected to localized buckling

10 forces,

11 each slot of each set of elongated slots separated

12 longitudinally along the length of the tube from each adjacent slot by

13 a bridge element of tube material.

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1 22. A foldable member comprising:
2 at least a first tube made of layers of material;
3 at least one predetermined hinge area along the length of the first
4 tube; and
5 a plurality of opposing elongated slots in the tube through the
6 layers of material forming separated longitudinal strips of layers of tube
7 material between the slots which fold when subjected to localized
8 buckling forces.

1 23. The foldable member of claim 22 in which first tube includes a sheet of
2 plastic material wrapped around itself several times forming the layers of tube material.

1 24. The foldable member of claim 23 further including an adhesive securing
2 the layers of plastic material to each other at selected locations along the length of the
3 tube.

1 25. The foldable member of claim 24 in which the adhesive is a tape.

1 26. The foldable member of claim 24 in which the sheet of plastic material
2 comes from a roll of plastic stock material and has a round memory.

1 27. The foldable member of claim 22 in which the layers of material are
2 laminated to each other except at the predetermined hinge area.